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[54] **DRIVEN CYLINDER**

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[30] **Foreign Application Priority Data**

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[51] **Int. Cl.**[6] **B41F 5/00**; B41F 13/10

[52] **U.S. Cl.** ..... **101/216**; 101/375; 310/67 R

[58] **Field of Search** ..... 101/216, 219, 101/365, 375; 310/67 R

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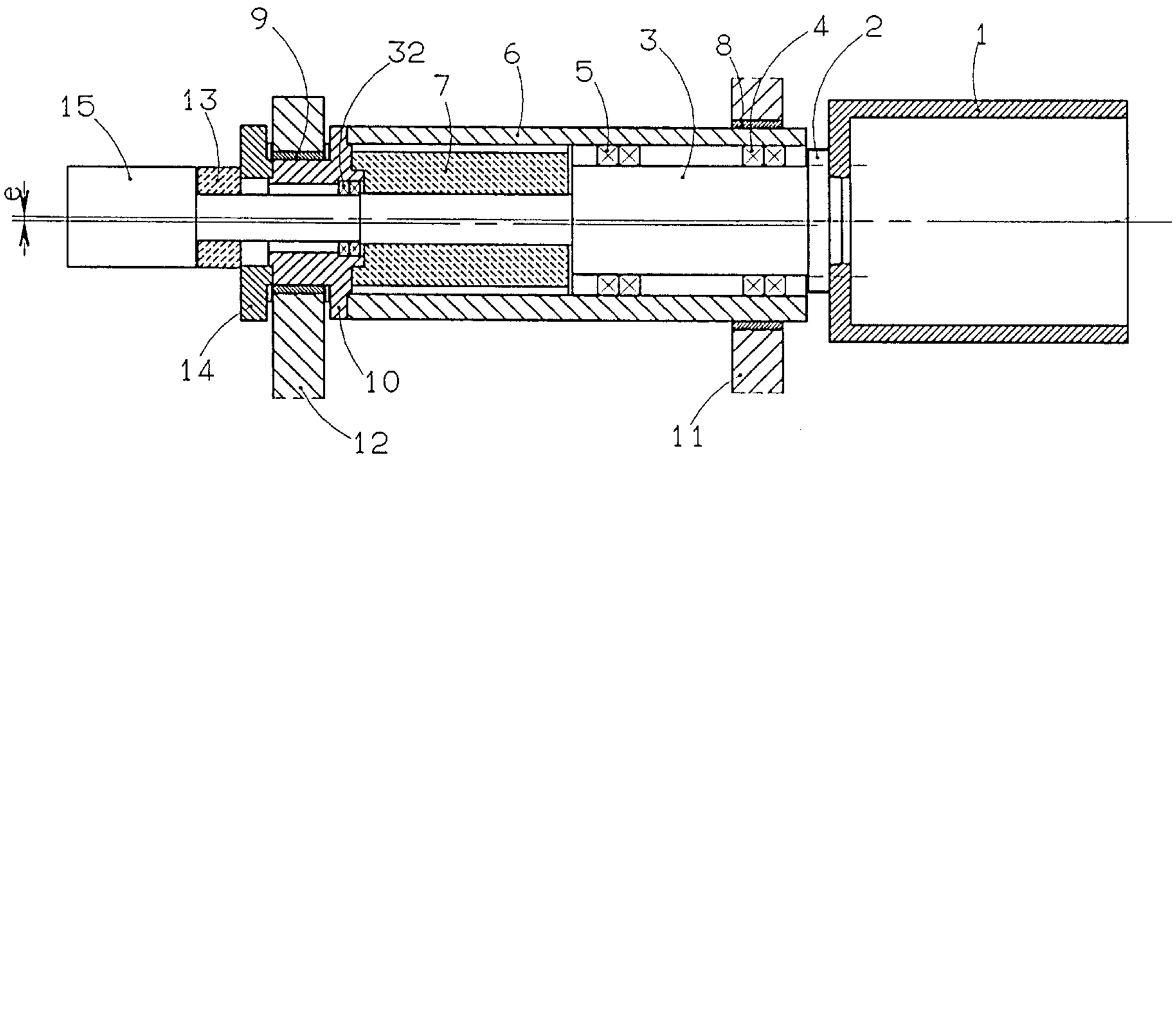
[57] **ABSTRACT**

In a compact drive for a float-mounted cylinder of a rotary printing machine, the spindle carrying the cylinder is housed together with a motor in a carrier tube mounted in the side wall.

9 Claims, 5 Drawing Sheets



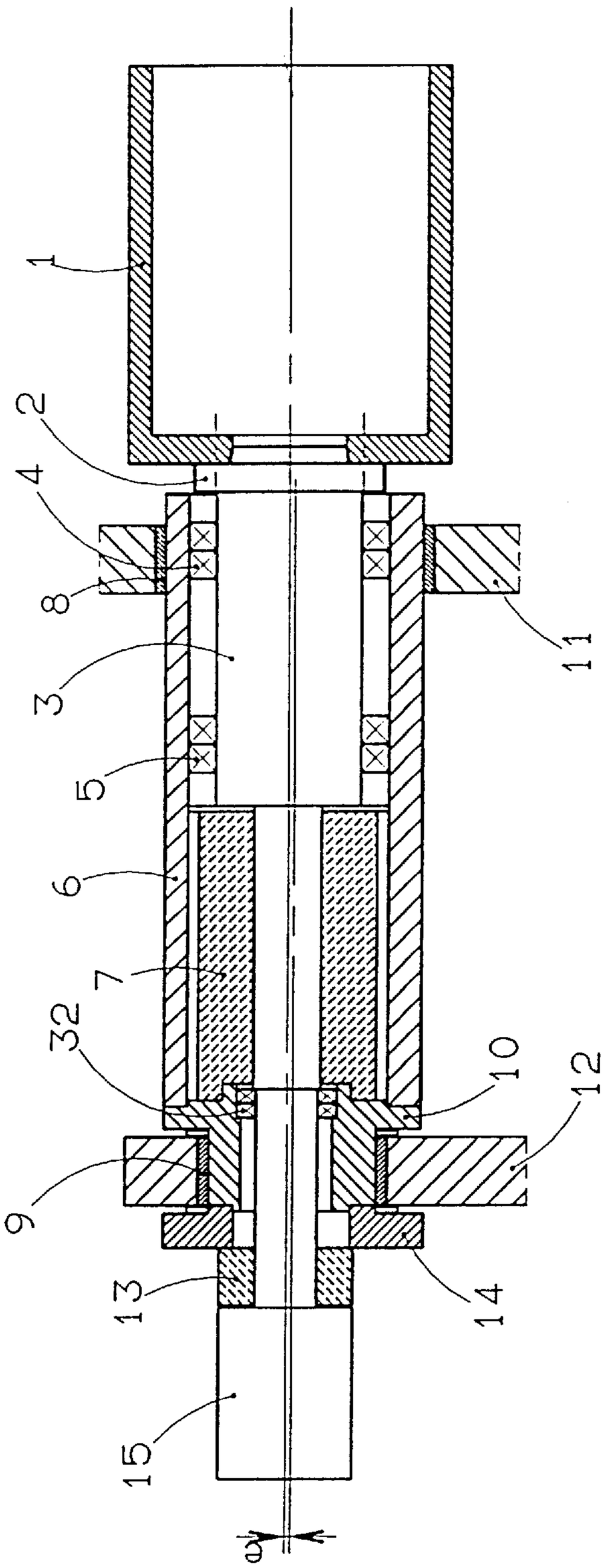


FIG. 1

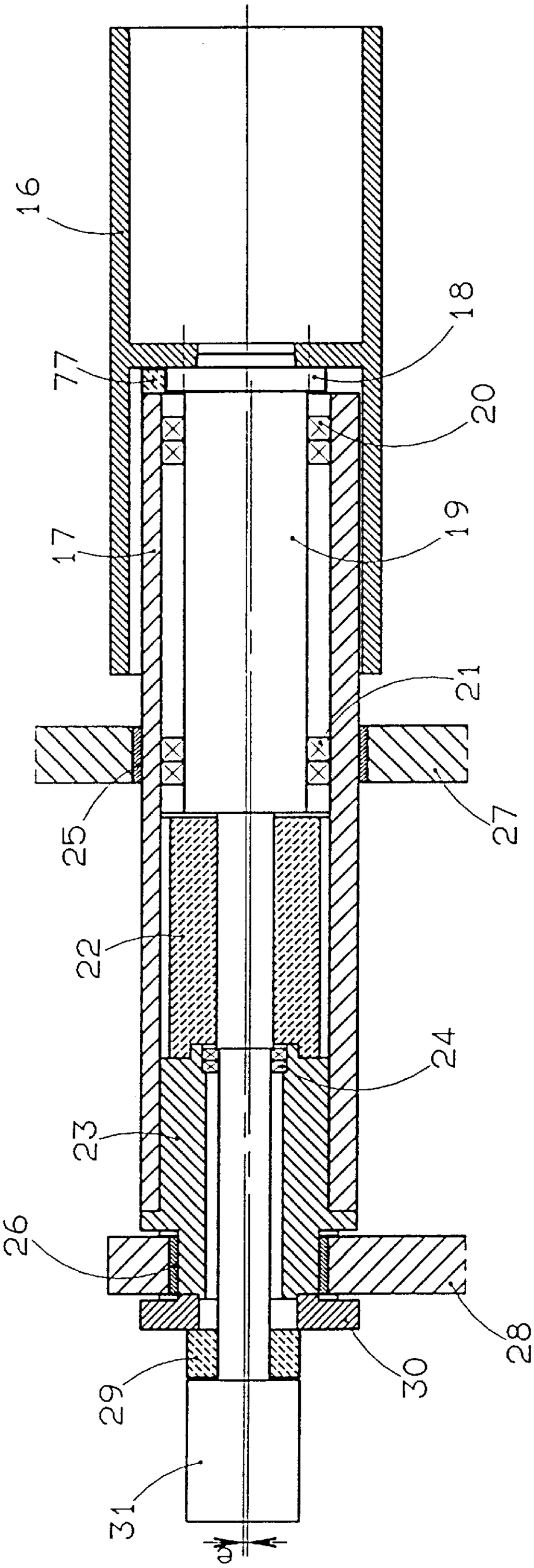


FIG. 2

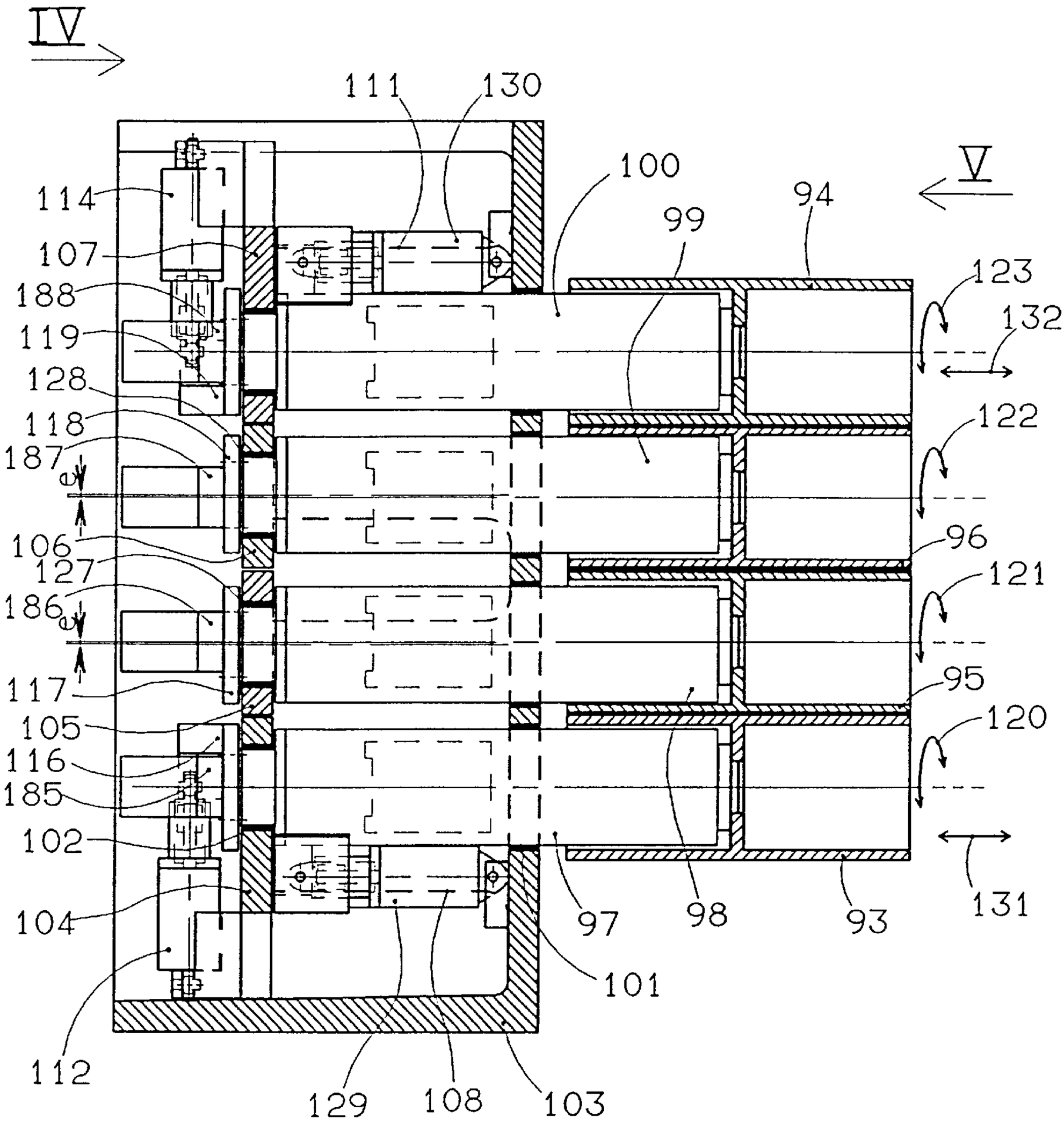

IV
V
111
130
100
99
94
114
107
188
119
128
118
187
106
127
186
117
105
116
185
102
104
112
129
108
103
101
97
98
93
131
123
132
122
96
121
95
120

FIG.3

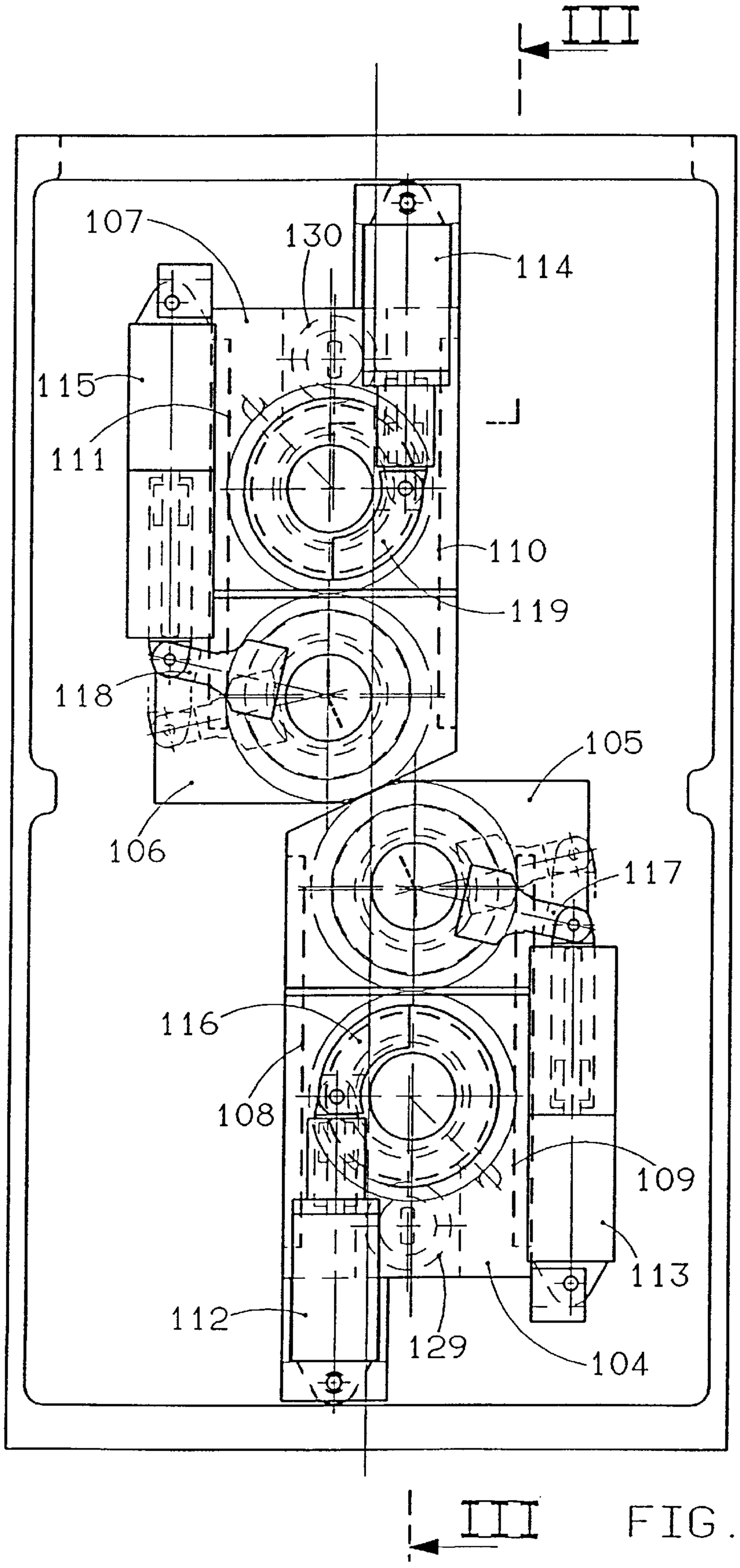

III
107
130
114
115
111
110
119
118
105
106
117
116
108
109
113
112
129
104
III

FIG. 4

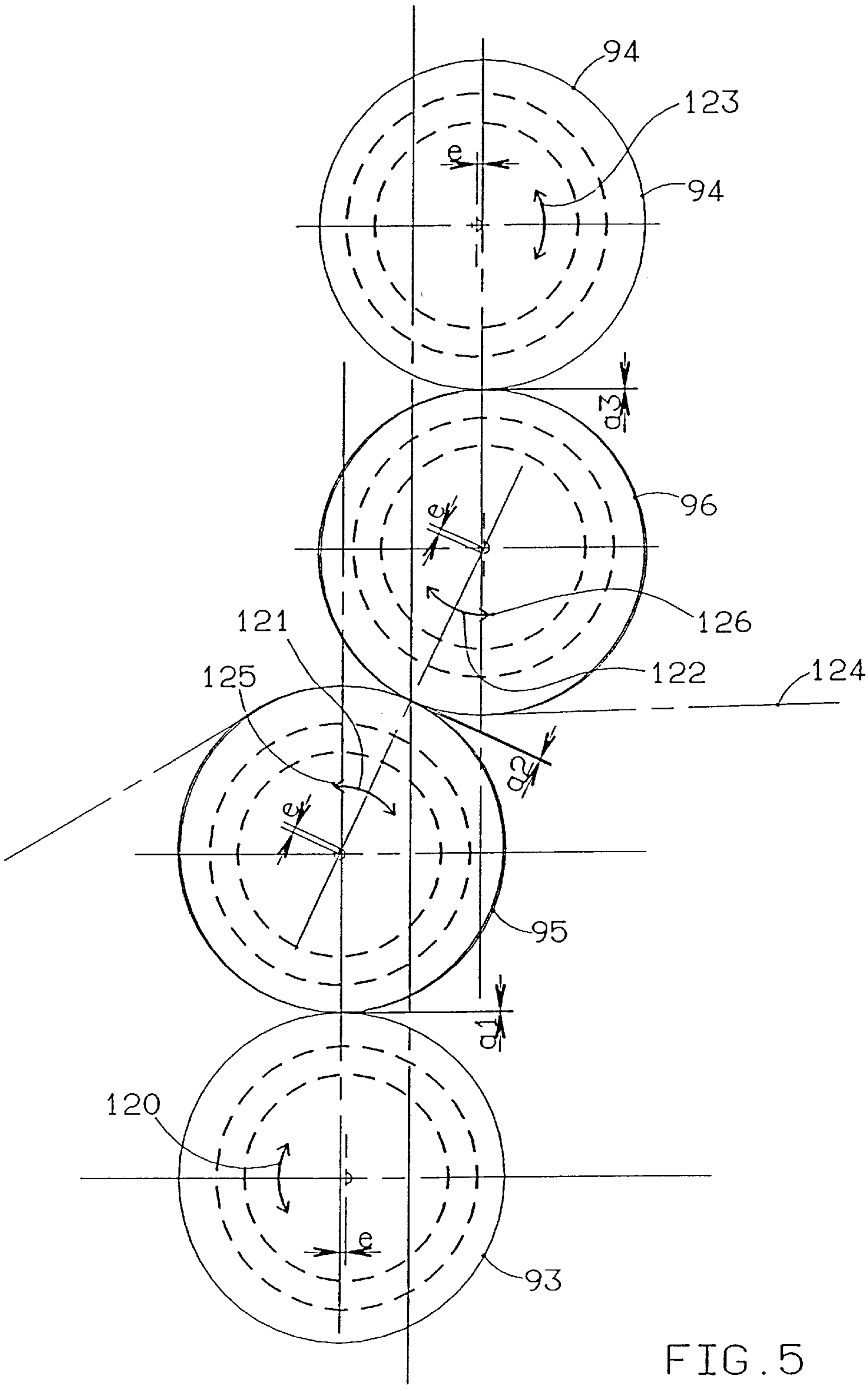


FIG. 5

DRIVEN CYLINDER

BACKGROUND OF THE INVENTION

1. Field of the Invention

The invention relates to a driven cylinder of an aggregate of a rotary printing machine.

2. Description of the Prior Art

German application DE 195 15 459.2 discusses a rubber blanket cylinder that is float-mounted in the side wall of a printing unit. The rubber blanket cylinder is attached to a spindle, which is mounted in a housing, which in turn is held in two walls. The spindle is driven by a drive to which it is connected or by toothed gears. Drives of this type are large and technically complicated. In some cases, oil lubrication is needed. Because of the elasticity of the drive, rotary play occurs at the driven cylinder. In toothed-gear drives, the torsion becomes even greater due to the backlash.

SUMMARY OF THE INVENTION

Accordingly, it is an object of the present invention to provide a play-free, compact drive for cylinders.

Pursuant to this object, and others which will become apparent hereafter, one aspect of the present invention resides in a driven cylinder of an aggregate of a rotary printing machine having a side wall in which the cylinder is float mounted, which driven cylinder is comprised of a spindle, a cylinder body arranged on the spindle, a rotatable carrier tube mounted in the side wall, the spindle being mounted in the carrier tube, and motor means for driving the cylinder body. The motor means being arranged in the carrier tube and connected to the spindle.

The direct attachment of the motor to the spindle carrying the cylinder guarantees a stable and play-free drive. Spindle units of this type are compact and have few individual parts, and thus can be economically built. Furthermore, no external lubrication is necessary. This cylinder type is advantageous, for example, in so-called single wall machines for small press runs. Form cylinders of this type are well-suited for the production of printing forms in the printing machine using what is known as "computer-to-press technology." Furthermore, the individual drive of cylinders of this type makes it possible to carry out set-up procedures simultaneously. For example, while a printing form is being produced on a form cylinder, an adjacent transfer cylinder can be separately driven for a washing procedure.

In another embodiment of the invention the cylinder is pot-shaped and has a bottom with an outer surface to which a head of the spindle is attached.

In another embodiment of the invention the cylinder body is configured to have a bottom approximately at a midpoint along a longitudinal axis of the cylinder. The spindle head being connected to the bottom of the cylinder body.

In still another embodiment of the invention, the carrier tube is rotatably mounted in the side wall and the spindle is mounted in the side wall eccentrically relative to the rotational axis of the carrier tube. Furthermore, adjustment means are provided for rotating the carrier tube.

Yet another embodiment of the invention provides the carrier tube to be mounted in the side wall in an axially movable manner. Adjustment means are provided for actually moving the carrier tube.

The driven cylinder can be configured as either a form cylinder, a transfer cylinder, a web transport roller or a folding unit cylinder.

The various features of novelty which characterize the invention are pointed out with particularity in the claims annexed to and forming a part of the disclosure. For a better understanding of the invention, its operating advantages, and specific objects attained by its use, reference should be had to the drawing and descriptive matter in which there are illustrated and described preferred embodiments of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

In the drawings:

FIG. **1** is a longitudinal section of a cylinder, including spindle unit, pursuant to the present invention;

FIG. **2** is a view similar to FIG. **1**, of a further embodiment;

FIG. **3** is a section of an offset printing group with float-mounted cylinders, along the line III—III in FIG. **4**;

FIG. **4** is a view IV in FIG. **3**; and

FIG. **5** is a view V in FIG. **3**.

DETAILED DESCRIPTION OF THE PRESENTLY PREFERRED EMBODIMENTS

FIG. **1** shows the float mounting of a cylinder **1**, which can be, for example, the form cylinder or transfer cylinder of a printing group. The cylinder **1** is pot-shaped, and its bottom is attached to the spindle head **2** of a spindle **3**. Advantageously, this attachment is carried out using screws, and the cylinder **1** is held without play by means of a ball socket. The spindle **3** is mounted in a carrier tube with high axial and radial rigidity by roller bearings **4**, **5**. A motor **7** (advantageously, a so-called "kit" motor), that is also supported in the carrier tube **6**, is located on an extended journal of the spindle **3**, which is also supported by a bearing **32**. This arrangement ensures a rigid, play-free connection of the motor **7** to the cylinder **1**. The carrier tube **6** is mounted in slide bearings **8**, **9** in a side wall **11** and in a support wall **12**. In the illustrated embodiment, the carrier tube **6** is sealed by a sleeve **10**, which is held in the slide bearing **9**. The bearing, which is located in the supporting wall **12**, provides the carrier tube **6** with especially stable support. The bearing can be designed, for example, as a plate screwed onto the side wall **11** with spacing supports or as a bridge screwed onto the side wall **11**. The carrier tube **6** can be rotated in the slide bearings **8**, **9**, which makes it possible for the positioning movements of the cylinder **1** described below to be carried out. To this end, the spindle **3**, along with the cylinder **1**, is eccentric to the rotational axis of the carrier tube **6**. In the illustrated embodiment, the bore in the carrier tube **6** in which the spindle **3** is mounted is eccentric to the outer tube diameter, which carries the bearing seat for accommodation in the slide bearing **8**. Similarly, the seat for the bearing **32** in the sleeve **10** is eccentric to the bearing seat for the slide bearing **9**.

A rotary encoder **13** required for the purpose of drive control is attached to the spindle **3** and supported by a lever **14**, which in turn is attached to the sleeve **10**. The spindle **3** is sealed by a two-way feed **15**, via which a liquid medium for printing process controls, e.g., a cooling device, can be fed into and out of the cylinder **1**.

FIG. **2** shows a cylinder **16** with a spindle unit that is wider in design and can therefore work with webs of greater width. The cylinder **16**, for example, a transfer cylinder, is double pot-shaped, i.e., it has a bottom located approximately at its middle. The cylinder **16** is attached by this bottom to the spindle head **18** of a spindle **19**. The spindle

19 is mounted by means of roller bearings **20, 21** in a carrier tube **17**, which also holds the kit motor **22** that is attached to the spindle **19**. The kit motor **22** is supported in the carrier tube **17** by means of a sleeve **23**. The extended journal of the spindle **19** also runs in a roller bearing **24**. The carrier tube **17** is mounted by means of slide bearings **25, 26** in a side wall **27** and a support wall **28**. The extended journal extends out of the side wall **27** to approximately the middle of the cylinder **16**. As a result, the spindle **19** is held in a highly stable fashion in this area. Furthermore, the central arrangement of the bottom, by which the cylinder **16** is attached to the spindle head **18**, is advantageous for low-bend operation of the cylinder **16**. Its load is thus distributed evenly on both two sides of the bottom.

As FIG. **2** also shows, a rotary encoder **29** attached to the spindle **19** is supported on a lever **30**, which in turn is attached to the sleeve **23**. Again, there is a two-way feed **31**, via which the media for printing process control can be fed into and out of the cylinder **16**. The cylinder **16** is eccentric relative to the pivot axis of the carrier tube **17**.

FIG. **2** also shows an alternative way to arrange a rotary encoder. A so-called spur gear rotary encoder **77** is located in the vicinity of the spindle head **18** at the end of the carrier tube **17**. The toothing for the rotary encoder **77** is worked into the external diameter of the spindle head **18**.

The float mounting is also suitable for other driven cylinders of printing machines. For example, a web transport roller or the cylinder of a folding unit can be attached to the spindle head **2, 18**.

In these cases, the eccentricity "e" can be omitted. It is also possible to manufacture the cylinder and the spindle from a single piece, for example, in the case of a folding unit cylinder.

FIGS. **3** to **5** show an offset printing group with float-mounted cylinders. The drawings depict a so-called double printing group, in which two printing groups work together on the blanket-to-blanket principle. Form cylinders **93, 94** and blanket cylinders **95, 96** are mounted with the eccentricity e on spindle units **97–100** (FIG. **3**). The spindle units **97–100** correspond in design to the spindle units shown in FIG. **2**. The spindle units **97–100** are mounted by slide bearings **101, 102** in a side wall **103** and a supporting wall. The supporting wall consists of plates **104–107**, which are screwed tightly onto webs or flanges **108–111** in the side wall **103**. However, this detail is not the subject matter of the invention and will therefore not be described further.

By means of adjustment units **112–115**, the spindle units **97–100** can be turned, as indicated by the double arrows **120–123**. For this purpose, levers **116–119** are located on the carrier tubes of the spindle units **97–100**. The adjustment units **112–115**, which rest directly or indirectly on the side wall **103** (FIG. **4**), act upon the levers **116–119**.

By pivoting the spindle units **97–100**, it is possible, thanks to the eccentricity e, to adjust the distances a**1** to a**3** of the form and transfer cylinders **93–96** relative to one another (FIG. **5**). The form cylinders **93, 94** transfer the printing image via the transfer cylinders **95, 96** onto both sides of a web **124**. Doing so requires maintaining an even linear force as well as a defined pressure between the transfer cylinders **95, 96**. This pressure is influenced by the thickness of the web **124** that runs between the transfer cylinders **95, 96**. The distance a**2** between the transfer cylinders **95, 96** must thus be set in accordance with the thickness of the web **124**. If a**2** changes, this will influence a**1** and a**3** as well. For this reason, to maintain flawless image transfers from the form cylinders **93, 94** onto the transfer cylinders **95, 96**, the distances a**1** and a**3** of these cylinders relative to one another must also be changed. This is done by activating the adjustment units **112, 114**.

Movement out of the printing position is also implemented by means of the adjustment units **113, 115**. For this purpose, the spindle units **98, 99** are pivoted into their extreme positions, whereby the distance a**2** reaches its maximum. The web **124** is then released by the transfer cylinders **95, 96**.

The spindle units **98, 99** that carry the transfer cylinders **95, 96** are axially fixed by axial bearings **127, 128**, while the spindle units **97, 100** that carry the form cylinders **93, 94** are movable in the axial direction, as indicated by the double arrows **131, 132** (FIG. **3**). By means of this movement, the lateral register can be set. The movement is implemented by means of adjustment units **129, 130**, which are supported on the side wall **103** and are connected to the spindle units **97, 100** in articulated fashion.

For the adjustment units **112–115** and **129** and **130**, hydraulic or pneumatic working cylinders can be used, for example, as can electric or electric-mechanical cylinders.

As in the embodiment in FIG. **1**, rotary encoders **185–188** are attached to the spindle units **97–100** for drive control.

The invention is not limited by the embodiments described above which are presented as examples only but can be modified in various ways within the scope of protection defined by the appended patent claims.

We claim:

1. A driven cylinder of an aggregate of a rotary printing machine with a side wall, in which the cylinder is float mounted, comprising:

a spindle;

a cylinder body arranged on the spindle;

a rotatable carrier tube mounted in the side wall, the spindle being mounted in the carrier tube; and

motor means for driving the cylinder body, the motor means being arranged in the carrier tube and connected to the spindle.

2. A driven cylinder as defined in claim **1**, wherein the cylinder body is pot-shaped with a bottom, the spindle having a spindle head attached to an outer surface of the cylinder body bottom.

3. A driven cylinder as defined in claim **1**, wherein the cylinder body is configured to have a bottom approximately at a mid-point along a longitudinal axis of the cylinder, the spindle having a head connected to the bottom of the cylinder body.

4. A driven cylinder as defined in claim **1**, wherein the carrier tube is rotatable mounted in the side wall, the spindle being mounted in the side wall eccentrically relative to a rotational axis of the carrier tube, and further comprising adjustment means for rotating the carrier tube.

5. A driven cylinder as defined in claim **1**, wherein the carrier tube is mounted in the side wall in an axially movable manner, and further comprising adjustment means for axially moving the carrier tube.

6. A driven cylinder as defined in claim **1**, wherein the cylinder is a form cylinder.

7. A driven cylinder as defined in claim **1**, wherein the cylinder is a transfer cylinder.

8. A driven cylinder as defined in claim **1**, wherein the cylinder is a web transport roller.

9. A driven cylinder as defined in claim **1**, wherein the cylinder is a folding unit cylinder.

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